

PATENT COOPERATION TREATY

PCT



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PD030007	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP 03/14735	International filing date (<i>day/month/year</i>) 22.12.2003	Priority date (<i>day/month/year</i>) 10.01.2003
International Patent Classification (IPC) or both national classification and IPC G11B7/00		
Applicant THOMSON LICENSING S.A. ET AL.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:
- I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 22.07.2004	Date of completion of this report 15.04.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Holubov, C Telephone No. +31 70 340-2923 

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I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-11 as originally filed

Claims, Numbers

1-7 received on 04.02.2005 with letter of 01.02.2005

Drawings, Sheets

1/1 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-7
	No: Claims	
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

2. Citations and explanations

see separate sheet

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

The present application meets criteria of **Article 33(1) PCT**, because the subject-matter of independent claim 1 appears to be new in the sense of **Article 33(2) PCT**, and to involve an inventive step in the sense of **Article 33(3) PCT**.

The following documents (D) are referred to in this communication:

D1: US 6 172 957 B1

D2: US2002 0036958 A1

D3: US 5 621 717 A

D4: US 5 907 530 A

- 1 **Document D2**, which is considered to be the closest prior art, teaches an optical element for correcting aberration and apparatus using the element for reading optical storage media of different thickness (Figure 6), including media with multiple data layers (embodiment 5, Figure 12). The apparatus may use a quarter wavelength plate and polarisation beam splitter to increase the optical efficiency (embodiment 3), in which case a **liquid crystal device** (Figure 10) **comprising two elements with perpendicular polarisation directions** is used to correct the aberration of both the incident and reflected beams. This corresponds to the possibility of using of two crossed LC elements mentioned in the introduction of the application (page 4 line 1-16)).
 - 1.1 With regard to the terms of **claim 1**, D2 discloses an apparatus (Figure 11, paragraph 134 or Figure 9, see paragraph 124) for reading from and/or writing to an optical recording medium (122) having at least two data layers situated one above another, having a device (Figure 10) for correcting an aberration that is experienced in the recording medium by an input beam used for reading from and/or writing to the recording medium, the input beam and a beam reflected at the recording medium having directions of polarization that are essentially perpendicular to one another during traversal of the device for correcting the aberration, the reflected beam being focused onto at least one detector (58,59).
 - 1.2 The subject-matter of claim 1 differs from that disclosed in D2 in that claim 1 further specifies that the device (4) for correcting the aberration (that is experienced in the recording medium by the input beam) is set up such that the reflected beam

traverses it uninfluenced, and in that means for compensating for the aberration experienced by the reflected beam are provided in the further beam path. The subject-matter of claim 1 is therefore novel with respect to the disclosure of D2.

- 1.3 It is the **normal task** of the person skilled in the art of information recording **to seek alternative solutions**. Seeking an alternative to the device shown in Figure 10, e.g. because of complexity and/or cost of the device, or because of the optical losses (as mentioned on page 4) which become more of a problem when the apparatus is used for recording, the skilled person would find prior art e.g. **D3** (annular filtering using means 100, see abstract, Figure 1, 1A, Figures 5-16) or **D4** (see abstract, column 5 lines 3-25) teaching the correction of spherical aberration of the reflected beams using elements in the detection arm (i.e. after the polarization beam splitter). He would **not**, however, apparently come to subject-matter within the scope of claim 1 in an obvious way, since to move the device for compensating for the aberration experienced by the reflected beam out of the path of the input beam would require two additional compensating devices to be placed between the diffraction grating/holographic optical element (91, which acts as a polarisation beam splitter) and the respective photodetectors (58, 59) instead of one compensating device. The use of two additional compensating devices leads to additional cost and complexity of control. Although the person skilled in the art could make such a modification to the apparatus of D2, there does not seem to be a compelling reason why he would make it, in view of the additional cost and complexity of control that two additional compensating devices would involve.
- 1.4 Other prior art: **Document D1** teaches an optical pickup for use in a multi-layer disc playback apparatus including wavefront aberration correcting means disposed between the light source and the objective lens. It does not comprise means for compensating for the aberration experienced by the reflected beam are provided in the further beam path. The subject-matter of claim 1 is therefore novel with respect to the disclosure of D1. Furthermore, the aberration experienced by the reflected beam is not mentioned in D1. Even if a person skilled in the art using the apparatus of D1 found the problem of aberration being experienced by the reflected beam, he could, for example, turn to document D2 and find an alternative solution for this problem by adding a further aberration correcting device to the device that is already present in the beam path of the input beam. Consequently, he would not necessarily at subject-matter within the scope of claim 1.
- 1.5 Claims 2-7 are dependent on claim 1 and as such also meet the requirements of

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the PCT with respect to novelty and inventive step.

Patent claims

(94)

1. An apparatus for reading from and/or writing to an optical recording medium (7) having at least two data layers situated one above another, having a device (4) for correcting an aberration that is experienced in the recording medium (7) by an input beam used for reading from and/or writing to the recording medium (7), the input beam and a beam reflected at the recording medium (7) having directions of polarization that are essentially perpendicular to one another during traversal of the device for correcting the aberration, the device (4) for correcting the aberration being set up such that the reflected beam traverses it uninfluenced, the reflected beam being focused onto at least one detector (13, 15, 17, 18, 20), **characterized** in that means (12, 16, 19) for compensating for the aberration experienced by the reflected beam are provided in the further beam path.

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2. The apparatus as claimed in claim 1, **characterized** in that the device (4) for correcting the spherical aberration consists of a liquid crystal element that influences the wave front in only one direction of polarization in order to balance the spherical aberration, a quarter-wave plate (5) being arranged downstream of the device (4) in the direction of the input beam.

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3. The device as claimed in claim 1 or 2, **characterized** in the correction means (12, 16, 19) provided in the further beam path are one or more beam splitters that are traversed by the reflected beam and split the latter into two or more partial beams, the individual partial beams being directed onto one detector (13, 15) each which are arranged such that the

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optical path length from the optical recording medium (7) to a detector (13, 15) is optimized for in each case one of the data layers.

5 4. The apparatus as claimed in claim 1 or 2,
characterized in that the correction means (12, 16, 19)
provided in the further beam path is a diffractive lens
that is traversed by the reflected beam and splits the
latter into two or more partial beams, the individual
10 partial beams being directed onto one detector (17, 18)
each which are arranged such that the optical path
length from the optical recording medium (7) to a
detector (17, 18) is optimized for in each case one of
the data layers.

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5. The apparatus as claimed in claim 3 or 5,
characterized in that the data signal is obtained from
the sum of the signals of the detectors (13, 15, 17,
18), and in that a focus error signal and/or a track
20 error signal are/is obtained from the signals of that
detector (13, 15, 17, 18) for which the optical path
length from the optical recording medium (7) to the
detector (13, 15, 17, 18) is optimized for the
respective data layer.

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6. The apparatus as claimed in claim 1 or 2,
characterized in that the correction means (12, 16, 19)
provided in the further beam path is a device (19) for
correcting the wave front that balances the aberration.

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7. The apparatus as claimed in claim 6, **characterized**
in that the device (19) for correcting the wave front
is a liquid crystal element.